

## 11- Terms and Conditions

Supergrid That part of the *national electricity transmission system* operated at a nominal voltage of ~~275kV~~ and above **200kV**.

Table 6.1 Pre-Fault Steady State Voltage Limits and Requirements in Planning Timescales

<b>(a) Voltage Limits on Transmission Networks</b>		
Nominal Voltage	Minimum ( <b>Note 1</b> )	Maximum
400kV	390kV (97.5%)	410kV (102.5%) <b>Note 2</b>
275kV	261kV (95%)	289kV (105%)
132kV	125kV (95%)	139kV (105%)
<b>(b) Voltages to be Achievable at Interfaces to Distribution Networks</b>		
Nominal Voltage		
Any	105% at forecast <i>Group Demand</i> ; 100% at forecast <i>Minimum Demand</i> , or as otherwise agreed with the relevant Network Operator	

### Notes

- It is permissible to relax these to the limits specified in Table 6.2 if:
  - following a *secured event*, the voltage limits specified in Table 6.2 can be achieved, and
  - there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales.
- It is permissible to relax this to 420kV (105%) if there is judged to be sufficient certainty that the limit of 420kV (105%) can be met in operational timescales.

Table 6.1: Pre-Fault Steady State Voltage Limits and Requirements in Planning Timescales

<b>(a) Voltage Limits on Transmission Networks</b>			
Nominal Voltage	PU Value (1 pu relates to the Nominal Voltage)	Minimum (percentage of Nominal Voltage) (Note 1)	Maximum (percentage of Nominal Voltage)
Greater than 300kV	0.975 pu-1.025 pu	-2.5%	+2.5% Note 2
200kV up to and Including 300kV	0.95 pu-1.05 pu	-5%	+ 5%
132kV up to and including 200kV	0.95 pu-1.05 pu	-5%	+ 5%
<b>(b) Voltages to be Achievable at Interfaces to Distribution Networks and Non-Embedded Customers</b>			
Any Nominal Voltage	1.05 pu at forecast <i>Group Demand</i> 1.00 pu at forecast <i>Minimum Demand</i> or as otherwise agreed with the relevant Network Operator or <i>Non-Embedded Customer</i> .		

### Notes

- It is permissible to relax these to the limits specified in Table 6.2 if:
  - following a *secured event*, the voltage limits specified in Table 6.2 can be achieved, and
  - there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales.
- it is permissible to relax this to ~~{105%} 420kV~~ of the nominal voltage if there is judged to be sufficient certainty that the limit of ~~420kV~~ ~~{105%} of the nominal voltage~~ can be met in operational timescales.

Table 6.2 Steady State Voltage Limits and Requirements in Planning Timescales

<b>(a) Voltage Limits on Transmission Networks</b>		
Nominal Voltage	Minimum	Maximum
400kV	380kV (95%) <b>Note 3</b>	410kV (102.5%) <b>Note 4</b>
275kV	248kV (90%)	289kV (105%)
132kV	119kV (90%)	139kV (105%)
<b>(b) Voltage Limits at Interfaces to Distribution Networks</b>		
Nominal Voltage		
Any	See below for the minimum voltage that must be achievable. Must always exceed lower limits of Table 6.4(b)	105%
<b>(c) Voltages to be Achievable at Interfaces to Distribution Networks</b>		
Nominal Voltage	-	
Any	100% at any demand level <b>Note 5</b> or as otherwise agreed with the relevant Network Operator	

**Notes**

3. It is permissible to relax this to 360kV (-10%) if the affected substations are on the same radially fed spur post-fault, and:
  - (i) there is no lower voltage interconnection from these substations to other *supergrid* substations; and
  - (ii) no auxiliaries of *large power stations* are derived from them.
4. It is permissible to relax this to 420kV (+5%) if there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales, and operational measures to achieve these are identified at the planning stage.
5. May be relaxed downwards following a secured event involving the outage of a Grid Supply Transformer, provided that there is judged to be sufficient certainty that the limits of Table 6.4(b) can be met in operational timescales.

Table 6.2: Steady State Voltage Limits and Requirements in Planning Timescales

(a) Voltage Limits on Transmission Networks			
Nominal Voltage	PU Value (1 pu relates to the Nominal Voltage)	Minimum (percentage of Nominal Voltage)	Maximum (percentage of Nominal Voltage)
Greater than 300kV	0.95 pu-1.025 pu	-5% (Note 3)	+2.5% (Note 4)
200kV up to and Including 300kV	0.90 pu-1.05 pu	-10%	+ 5%
132kV up to and including 200kV	0.90 pu-1.05 pu	-10%	+ 5%
(b) Voltage Limits at Interfaces to Distribution Networks <i>and Non-Embedded Customers</i>			
Any Nominal Voltage	See below for the minimum voltage that must be achievable. Must always exceed lower limits of Table 6.4 (b)		+5%
(c) Voltages to be Achieved at Interfaces to Distribution Networks <i>and Non-Embedded Customers</i>			
Any <b>Nominal Voltage</b>	1.00 pu at any demand level (Note 5) or as otherwise agreed with the relevant <i>Network Operator or Non-Embedded Customer</i> .		

### Notes

3. it is permissible to relax this to 90% of the nominal voltage 360kV (-10%) if the affected substations are on the same radially fed spur post-fault, and:

- (i) there is no lower voltage interconnection from these substations to other *supergrid* substations; and
- (ii) no auxiliaries of *large power stations* are derived from them.

4. it is permissible to relax this to 105% of the nominal voltage 420kV (+5%) if there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales, and operational measures to achieve these are identified at the planning stage.

5. May be relaxed downwards following a secured event involving the outage of a *Grid Supply Transformer*, provided that there is judged to be sufficient certainty that the limits of Table 6.4(b) can be met in operational timescales

Table 6.3 Pre-Fault Steady State Voltage Limits and Targets in Operational Timescales

<b>(a) Voltage Limits on Transmission Networks</b>		
Nominal Voltage	Minimum	Maximum
400kV	380kV (95%) <b>Note 6</b>	420kV (105%)
275kV	261kV (95%) <b>Note 6</b>	300kV (109%)
132kV	125kV (95%) <b>Note 6</b>	145kV (110%)
<b>(b) Voltages to be Achievable at Interfaces to Distribution Networks</b>		
Nominal Voltage	-	
Any	Target voltages and voltage ranges as agreed with the relevant Distribution Network Operators, within the limits of Table 6.4	

**Notes**

6. It is permissible to relax this to 90% at substations if no auxiliaries of *large power stations* are derived from them.

Table 6.3: Pre-Fault Steady State Voltage Limits and Targets in Operational Timescales

<b>(a) Voltage Limits on Transmission Networks</b>			
Nominal Voltage	PU Value (1pu relates to the Nominal Voltage)	Minimum (percentage of Nominal Voltage)	Maximum (percentage of Nominal Voltage)
Greater than 300kV	0.95 pu-1.05 pu	-5% Note 6	+5%
200kV up to and Including 300kV	0.95 pu-1.09 pu	-5% Note 6	+ 9%
132kV up to and including 200kV	0.95 pu-1.10 pu	-5% Note 6	+ 10%
<b>(b) Voltages to be Achievable at Interfaces to Distribution Networks and Non-Embedded Customers</b>			
Any Nominal Voltage	Target voltages and voltage ranges as agreed with the relevant Distribution Network Operators or <i>Non-Embedded Customers</i> , within the limits of Table 6.4		

**Notes**

6. It is permissible to relax this to 90% at substations if no auxiliaries of *large power stations* are derived from them.

Table 6.4 Steady State Voltage Limits and Targets in Operational Timescales

<b>(a) Voltage Limits on Transmission Networks</b>		
Nominal Voltage	Minimum	Maximum
400kV	360kV (90%)	420kV (105%) <b>Note 7</b>
275kV	248kV (90%)	300kV (109%)
132kV	119kV (90%)	145kV (110%)
<b>(b) Voltage Limits at Interfaces to Distribution Networks</b>		
Nominal Voltage		
132kV	119kV (90%)	145kV (110%)
At less than 132kV	94%	106%

**Notes**

7. May be relaxed to 440kV (110%) for no longer than 15 minutes following a *secured event*.

Table 6.4: Steady State Voltage Limits and Targets in Operational Timescales

<b>(a) Voltage Limits on Transmission Networks</b>			
Nominal Voltage	PU Value (1pu relates to the Nominal Voltage)	Minimum (percentage of Nominal Voltage)	Maximum (percentage of Nominal Voltage)
Greater than 300kV	0.90 pu-1.05 pu	-10%	+5% Note 7
200kV up to and Including 300kV	0.90 pu-1.09 pu	-10%	+ 9%
132kV up to and including 200kV	0.90 pu-1.10pu	-10%	+ 10%
<b>(b) Voltages to be Achievable at Interfaces to Distribution Networks and Non-Embedded Customers</b>			
Nominal Voltage			
132kV	0.90 pu- 1.10 pu	-10%	+ 10%
At Less than 132kV	0.94 pu-1.06 pu	-6%	+6%

**Notes**

7. May be relaxed to ~~{110%}~~ for no longer than 15 minutes following a *secured event*.

It is important to note there are no changes proposed to Chapter 10- Offshore voltage limits. These changes only apply to the onshore voltage limits as specified above, with the principle being the same having a ranges of voltages.

It is also of note that, there are some differences between the voltage ranges in the tables included in this proposed modification and those specified in the Grid Code modification. These variations relate to existing differences in specification and are not in scope of this modification.